Optical Sensor in Vehicles

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Abstract- When the vehicels turns in curve at night, it can always appear "the blind spot" in the turn, for the lights are unable to adjust the illumination angle. In order to enhance safety driving at night, an adaptive front-lighting system (AFS) of automobile controlled by STC12C5A60AD which is the core of electric control unit is designed in this work. The AFS is based on the steering wheel angle and speed changes to adjust light axis angle to light up the road in the front, so the drivers' security vision are improved. The work principles of the AFS[6] and control model and hardware circuits are particularly described..

Keywords- optical sensor, Relay, LDR, LCD.

I. INTRODUCTION

In vehicles switching the head light up and down when another vehicles are coming during night need to do manually. In this work switching ON/OFF of the head light is made automatically by using light sensors such as LDR (Light depended resistors).when the LDR senses the light then it automatically switch the down light else it will switch to head light .In this work LED((light emitting diodes) are used for head light and down light indications.

II. THE BLOCK DIAGRAM

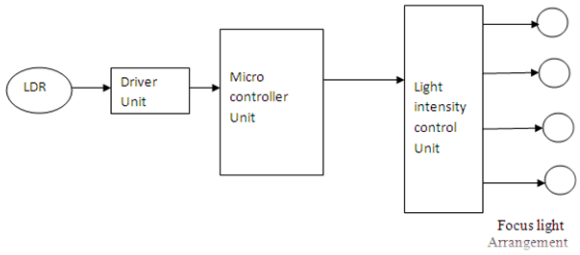

Fig. 1. Block diagram of this work is illustrated.

III. HARDWARE AND SOFTWARE PART

Hardware:
Power supply
LDR and driver Unit
Microcontroller
Light control unit
Focus light arrangement
Software:
Keil
Embedded C
Proload burner software

3.1.1 Power Supply:

Power supply required for the micro controller 89C51 is 5 volts. The LM78XX series of three terminal regulators is available with several fixed output voltages making them useful in a wide range of applications.
Initially a step down transformer is used to step down the input voltage to be given to the rectifier, which converts A.C voltage to D.C voltage.

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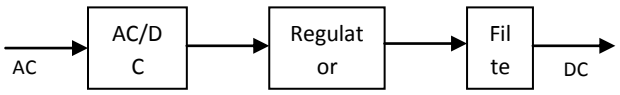


Fig 2: Block diagram of power supply

A transformer is a device that transfers electrical energy from one circuit to another through inductively coupled coils or "windings. A varying current in the first or "primary" winding creates a varying magnetic field in the core of the transformer. This increasing magnetic field induces a increasing electromotive force (EMF) or "voltage" in the "secondary" winding. This effect is called mutual induction.
If a load is connected to the secondary circuit, electric energy or current will flow in the secondary winding of the transformer and transfer energy from the primary circuit to the load connected in the secondary circuit.
By appropriate selection of number of turns a transformer thus allows an alternating voltage to be stepped up by making Ns more than Np or stepped down , by making it vice versa
The transformer produces 12 volts D.C. This is given to the 7805-voltage regulator to produce 5 volts D.C. The voltage ranges of different 78xx series are given below.
VOLTAGE RANGE

- LM7805C 5V
- LM7812C 12V
- LM7815C 15

For high power lamp switching one can connect Relay (electromagnetic switch)

3.1.2 Regulator (78XX)

It is a 3 pin IC use as a voltage regulator it converts unregulated DC current in to regulated dc current. Normally we get fixed output by connecting the voltage regulator at the output of the filtered DC .It can also be used in circuit to get low DC voltage from a high DC voltage.

3.1.3 Relay:

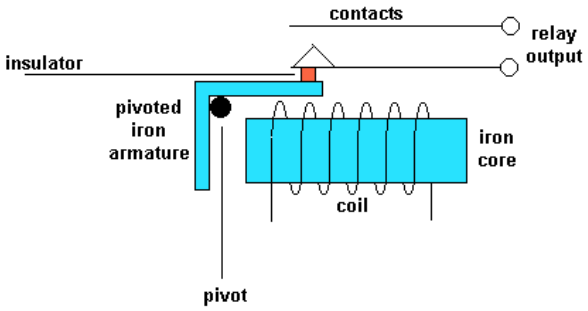


Fig 3: Relay

A relay is an electrical switch that opens and closes under the control of another electrical circuit. A relay is able to control an output circuit of higher power than the input circuit, it can be considered to be, in a broad sense, a form of an electrical amplifier.

Relays are usually SPDT (single pole double through switch) or DPDT (double pole double through switch) but they can have many more sets of switch contacts, for example relays with 4 sets of changeover contacts are readily available.

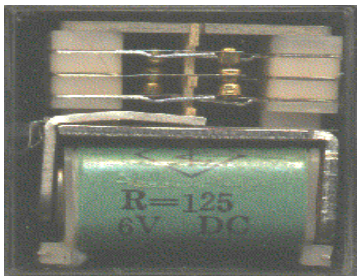


Fig 4: Relay2

3.1.3.1 Basic operation of a relay:

An electric current through a conductor will produce a magnetic field at right angles to the direction of electron flow. If that conductor is wrapped into a coil shape, the magnetic field produced will be oriented along the length of the coil. The greater the current, the greater the strength of the magnetic field, all other factors being equal.

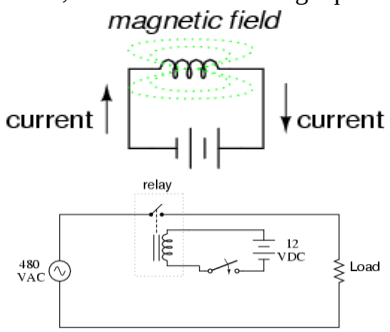


Fig 5:Internal structure of Relay

If we place a magnetic object near such a coil for the purpose of making that object move when we energize the coil with electric current, we have what is called a *solenoid*. The movable magnetic object is called an *armature*, and most armatures can be moved with either direct current (DC) or alternating current (AC) energizing the coil. The polarity of the magnetic field is irrelevant for the purpose of attracting an iron armature.

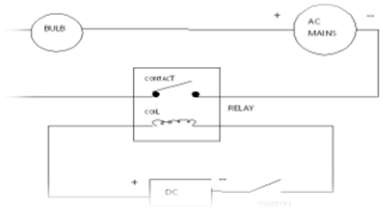


Fig 6: block diagram of Relay

A relay is an electrically operated switch. Current flowing through the coil of the relay creates a magnetic field which attracts a lever and changes the switch contacts. The coil current can be on or off so relays have two switch positions and most have double throw (changeover) switch contacts as shown in the diagram.

Relays allow one circuit to switch a second circuit which can be completely separate from the first. For example a low voltage battery circuit can use a relay to switch a 230V AC mains circuit. There is no electrical connection inside the relay between the two circuits, the link is magnetic and mechanical.

Relays thus enables controlling an AC device through DC. The relay's switch connections are usually labeled COM, NC and NO:

- COM = Common, always connect to this, it is the moving part of the switch.
- NC = Normally Closed, COM is connected to this when the relay coil is off.
- NO = Normally Open, COM is connected to this when the relay coil is on.
- Connect to COM and NO if you want the switched circuit to be on when the relay coil is on.
- Connect to COM and NC if you want the switched circuit to be on when the relay coil is off.

3.2 Light Dependent Resistor(LDR)

To detect the present of an object we have used LDR and a source of light. LDR is a special type of resistance whose value depends on the brightness of the light, which is falling on it. It has resistance of about 1 mega ohm when in total darkness, but a resistance of only about 5k ohms when brightness illuminated. It responds to a large part of light spectrum.[2]

1) LDR use should be sensitive before using in the circuits it should tested with the multimeter.
2) IC should not be heated much while soldering, too much heat can destroy the IC while placing the IC pin no 1 should be make sure at right hole.
3) Opposite polarity of the battery can destroy the IC so check the polarity before switching on the circuits. one should use diode in series with switch for safety because diode allows current in only one direction.
4) Each component should be soldered neatly and clean
5) LDR should be adjusted that it should not get light from streetlight

3.3 Light Emitting Diode (LED):

Light emitting diodes, or LEDs, differ from regular diodes in that when a voltage is applied, they emit light. This light can be red (most common), green, yellow, orange, blue (not very common), or infrared. LEDs are used as indicators, transmitters, etc. Most likely, a LED will never burn out like a regular lamp will and requires many times less current.LED are uses to obtain fixed voltage. The voltage drop of LED is comparatively stable at just about 2v .[6]

3.4 LCD (Liquid Cristal Display)

A liquid crystal display (LCD) is a thin, flat display device made up of any number of color or monochrome pixels arrayed in front of a light source or reflector. Each pixel consists of a column of liquid crystal molecules suspended between two transparent electrodes, and two polarizing filters, the axes of polarity of which are perpendicular to each other. Without the liquid crystals between them, light passing through one would be blocked by the other. The liquid crystal twists the polarization of light entering one filter to allow it to pass through the other.

3.4.1 Features:

(1) Interface with either 4-bit or 8-bit microprocessor.
(2) Display data RAM
(3) 80x8 bits (80 characters).
(4) Character generator ROM
(5). 160 different 5 x 7 dot-matrix character patterns.
(6). Display data RAM and character generator RAM may be Accessed by the microprocessor.

(7) Numerous instructions
(8). Clear Display, Cursor Home, Display ON/OFF, Cursor ON/OFF, Blink Character, Cursor Shift, Display Shift.

Several different LCD technologies exists. “supertwist” types, for example, offer Improved contrast and viewing angle over the older “twisted nematic” types. Some modules are available with back lighting, so that they can be viewed in dimly-lit conditions. The back lighting may be either “electro-luminescent”, requiring a high voltage inverter circuit, or simple LED illumination.

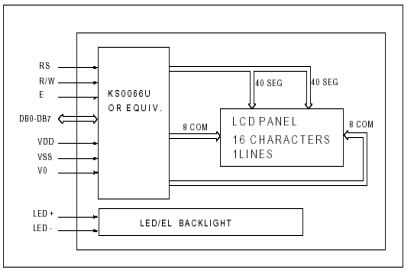


Fig 7: block diagram of LCD

3.4.2 Power supply for lCD driving:

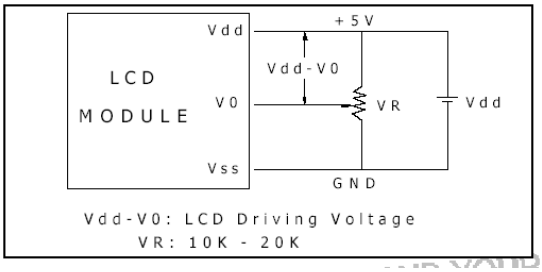


Fig 8: power supply of LCD

3.4.3 PIN DESCRIPTION:

Most LCDs with 1 controller has 14 Pins and LCDs with 2 controller has 16 Pins (two pins are extra in both for back-light LED connections).

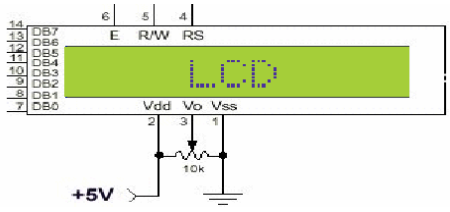


Fig 9: pin diagram of 1x16 lines LCD

PIN	SYMBOL	FUNCTION
1	Vss	Power Supply(GND)
2	Vdd	Power Supply(+5V)
3	Vo	Contrast Adjust
4	RS	Instruction/Data Register Select
5	R/W	Data Bus Line
6	E	Enable Signal
7-14	DB0-DB7	Data Bus Line
15	A	Power Supply for LED B/L(+)
16	K	Power Supply for LED B/L(-)

Table1: pin description

3.4.4 Control lines of LCD:

EN:
Line is called "Enable." This control line is used to tell the LCD that you are sending it data. To send data to the LCD, your program should make sure this line is low (0) and then set the other two control lines and/or put data on the data bus. When the other lines are completely ready, bring EN high (1) and wait for the minimum amount of time required by the LCD datasheet (this varies from LCD to LCD), and end by bringing it low (0) again.[2]

RS:
Line is the "Register Select" line. When RS is low (0), the data is to be treated as a command or special instruction (such as clear screen, position cursor, etc.). When RS is high (1), the data being sent is text data which should be displayed on the screen. For example, to display the letter "T" on the screen you would set RS high.

RW:
Line is the "Read/Write" control line. When RW is low (0), the information on the data bus is being written to the LCD. When RW is high (1), the program is effectively querying (or reading) the LCD. Only one instruction ("Get LCD status") is a read command. All others are write commands, so RW will almost always be low.
Finally, the data bus consists of 4 or 8 lines (depending on the mode of operation selected by the user). In the case of an 8-bit data bus, the lines are referred to as DB0, DB1, DB2, DB3, DB4, DB5, DB6, and DB7.

3.4.5 Logic status on control lines:

• E = 0 Access to LCD disabled
E=1 Access to LCD enabled
• R/W = 0 ,Writing data to LCD
R/W = 0 ,1 Reading data from LCD
• RS = 0, Instructions
RS = 0, 1 Character

3.4.6 Writing data to the LCD:

1) Set R/W bit to low
2) Set RS bit to logic 0 or 1 (instruction or character)
3) Set data to data lines (if it is writing)
4) Set E line to high
5) Set E line to low

3.4.7 Read data from data lines on LCD:

1) Set R/W bit to high
2) Set RS bit to logic 0 or 1 (instruction or character)
3) Set data to data lines (if it is writing)
4) Set E line to high
5) Set E line to low

3.4.8 Initialization by Instructions:

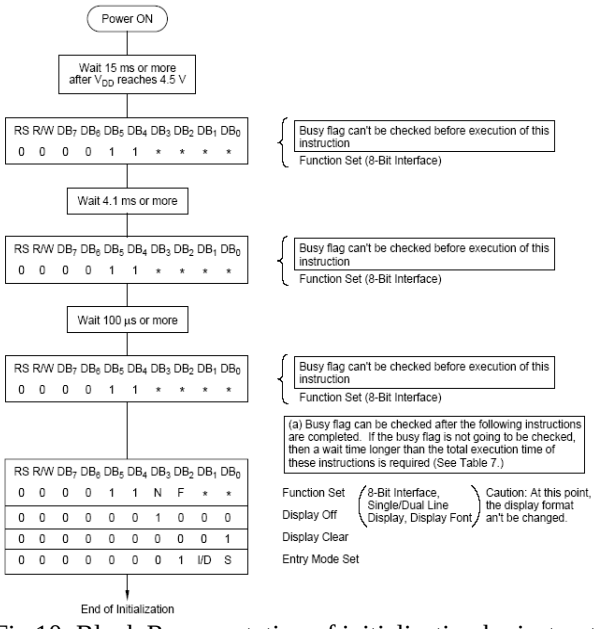

Power ON
Wait 15 ms or more after VDD reaches 4.5 V
RS R/W DB7 DB6 DB5 DB4 DB3 DB2 DB1 DB0
0 0 0 0 1 1 * * * *
Busy flag can't be checked before execution of this instruction
Function Set (8-Bit Interface)
Wait 4.1 ms or more
RS R/W DB7 DB6 DB5 DB4 DB3 DB2 DB1 DB0
0 0 0 0 1 1 * * * *
Busy flag can't be checked before execution of this instruction
Function Set (8-Bit Interface)
Wait 100 µs or more
RS R/W DB7 DB6 DB5 DB4 DB3 DB2 DB1 DB0
0 0 0 0 1 1 * * * *
Busy flag can't be checked before execution of this instruction
Function Set (8-Bit Interface)
(a) Busy flag can be checked after the following instructions are completed. If the busy flag is not going to be checked, then a wait time longer than the total execution time of these instructions is required (See Table 7.)
RS R/W DB7 DB6 DB5 DB4 DB3 DB2 DB1 DB0
0 0 0 0 1 1 N F * *
Function Set
0 0 0 0 0 0 1 0 0 0
Display Off
0 0 0 0 0 0 0 0 0 1
Display Clear
0 0 0 0 0 0 0 1 I/D S
Entry Mode Set
8-Bit Interface, Single/Dual Line Display, Display Font
Caution: At this point, the display format an't be changed.
End of Initialization

Fig 10: Block Representation of initialization by instruction

3.4.9 LCD Display

- A Liquid crystal display (LCD) is a low cost, low power device capable of displaying text and images.
- The LCD controller provides a relatively simple interface between a processor and an LCD. LCDs can be added quite easily to an application and use as few as three digital output pins for control.

Figure8.1: Schematic diagram of an LCD

There are different types of LCDs such as reflective LCD, absorption LCD, dot matrix LCD. Each type of LCD is able to display multiple characters. In addition, each character may be displayed in normal or inverted fashion. The LCD may permit a character to be blinking or may permit display of a cursor indicating the" current" character. Such functionality would be difficult to be implemented using software.

Thus, an LCD controller is used to provide a simple interface to an LCD, perhaps eight data inputs and one enable input. This byte may be a control word, which can be an instruction or data word The most common connector used for the 44780 based LCDs is 14 pins in a row, with pin centers 0.100" apart

3.5 Buzzer

A **buzzer** or **beeper** is a signaling device, usually electronic, typically used in automobiles, household appliances such as a microwave oven, or game shows.

a ceramic-based piezoelectric sounder like a Son alert which makes a high-pitched tone. Usually these were hooked up to "driver" circuits which varied the pitch of the sound or pulsed the sound on and off.

IV. SOFTWARE EXPLANATION

4.1 Keil Software

Installing the Keil software on a Windows PC

- Insert the CD-ROM in your computer's CD drive
- On most computers, the CD will "auto run", and you will see the Keil installation menu. If the menu does not appear, manually double click on the Setup icon, in the root directory: you will then see the Keil menu.
- On the Keil menu, please select "Install Evaluation Software". (You will not require a license number to install this software).
- Follow the installation instructions as they appear.

Loading the Projects

The example projects for this book are NOT loaded automatically when you install the Keil compiler.

These files are stored on the CD in a directory "/Pont". The files are arranged by chapter: for example, the work discussed in Chapter 3 is in the directory "/Pont/Ch03_00-Hello".

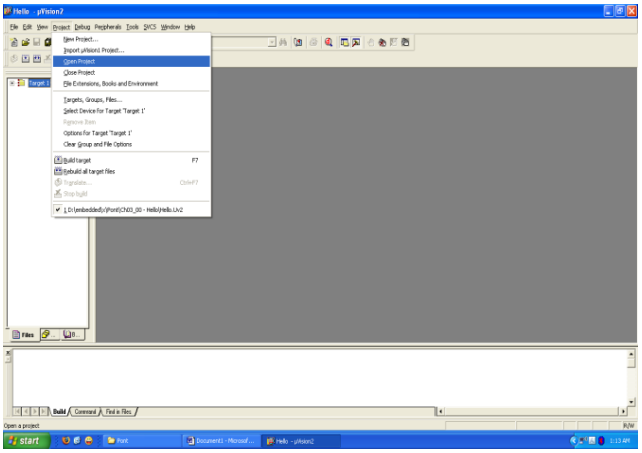
Rather than using this work on the CD (where changes cannot be saved), please copy the files from CD onto an appropriate directory on your hard disk.

Note: you will need to change the file properties after copying: file transferred from the CD will be 'read only'.

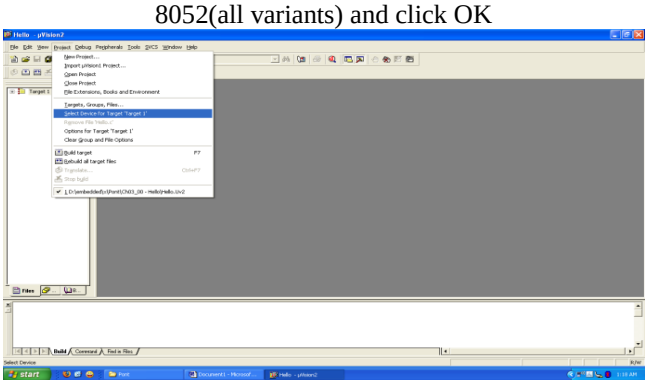
4.2 Configuring the Simulator

Open the Keil µVision2[4]

Go to Project – Open Project and browse for Hello in Ch03_00 in Pont and open it.

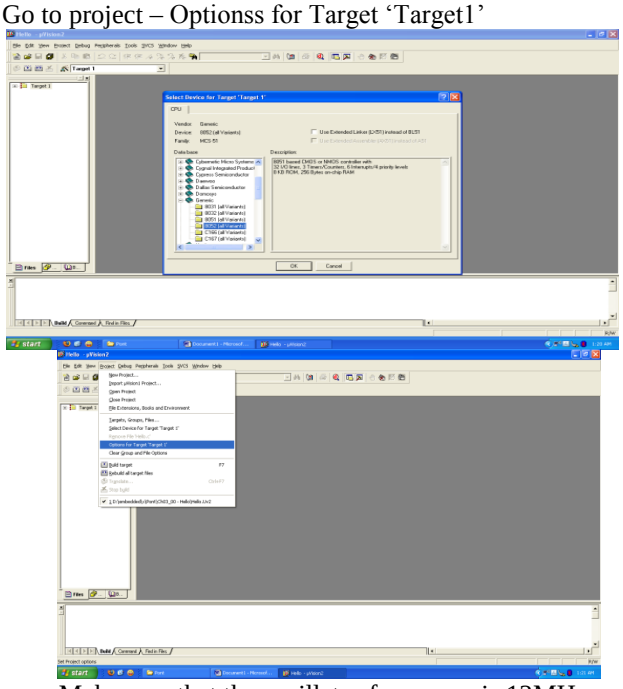


Go to Project – Select Device for Target 'Target1' Select 8052(all variants) and click OK

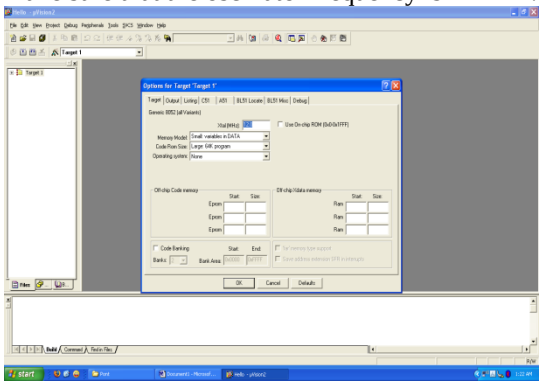


Now we need to check the oscillator frequency:

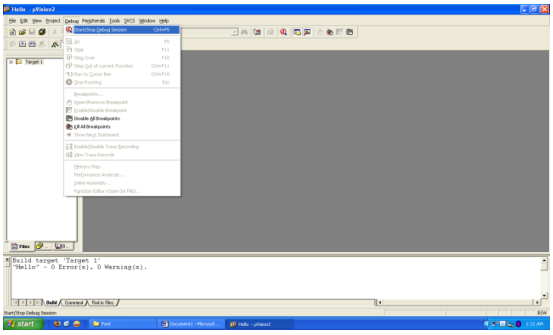
Go to project – Optionss for Target 'Target1'



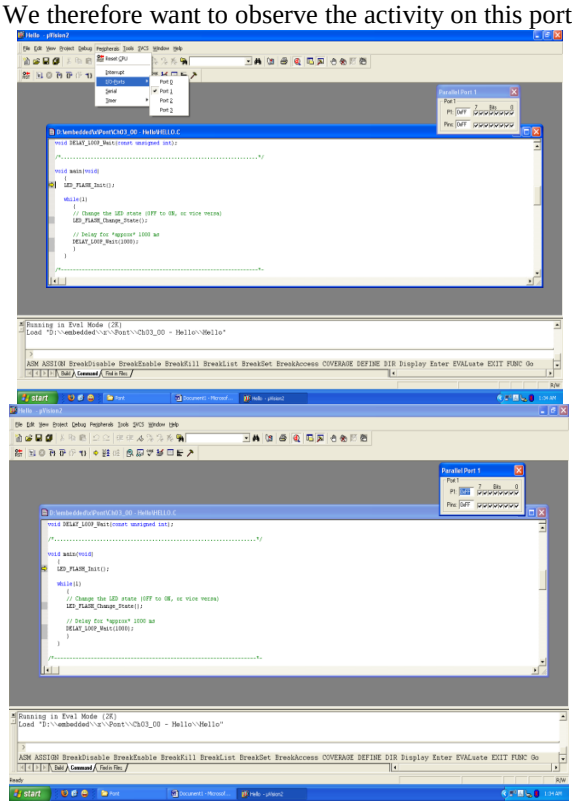
Make sure that the oscillator frequency is 12MHz.



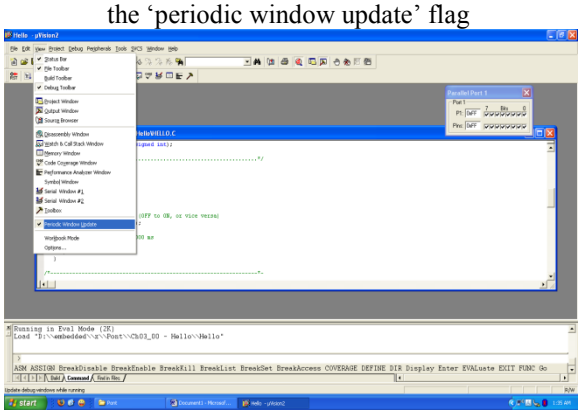
First start a debug session



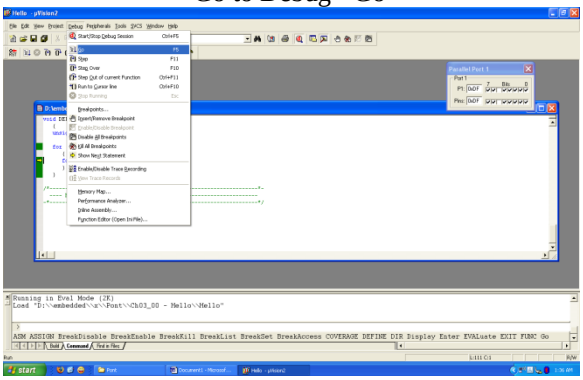
The flashing LED we will view will be connected to Port 1. We therefore want to observe the activity on this port

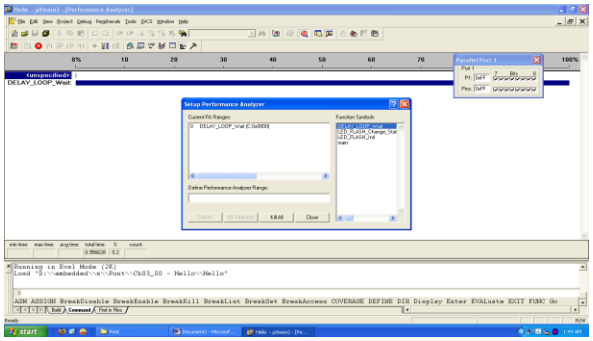


To ensure that the port activity is visible, we need to start the 'periodic window update' flag



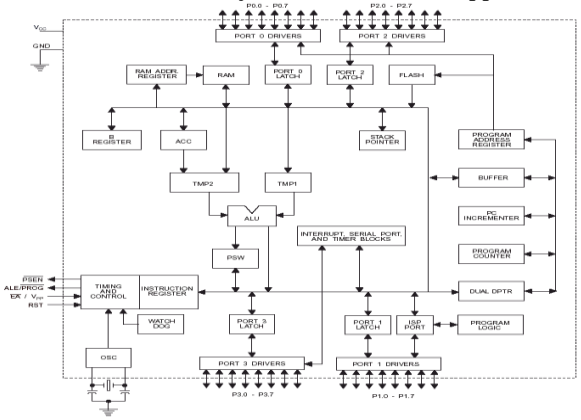
Go to Debug - Go





4.2 Description of microcontroller 89S52:

The AT89S52 is a low-power, high-performance CMOS 8-bit micro controller with 8Kbytes of in-system programmable Flash memory. The device is manufactured Using Atmel's high-density nonvolatile memory technology and is compatible with the industry-standard 80C51 micro controller. The on-chip Flash allows the program memory to be reprogrammed in-system or by a conventional nonvolatile memory programmer. By combining a versatile 8-bit CPU with in-system programmable flash one monolithic chip; the Atmel AT89S52 is a powerful micro controller, which provides a highly flexible and cost-effective solution to many embedded control applications.



Pin Configurations

PDIP

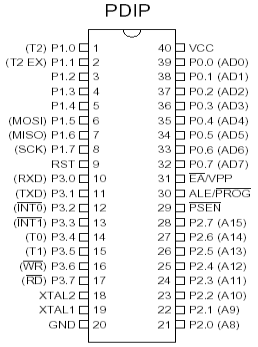


Fig 11: architecture and pin configuration of microcontroller

The AT89S52 provides the following standard features: 8K bytes of Flash, 256 bytes of RAM, 32 I/O lines, Watchdog timer, two data pointers, three 16-bit timer/counters, full duplex serial port, on-chip oscillator, and clock circuitry. In addition, the AT89S52 is designed with static logic for pertain down to zero frequency and supports two software selectable power saving modes. The Idle Mode stops the CPU while allowing the RAM timer/counters, serial port, and interrupt system to continue functioning. The Power-down mode saves the RAM contents but freezes the oscillator, disabling all other chip functions until the next interrupt

V. CONCLUSION

The developed system was put under a series of tests for ascertaining its performance as a protective device and very satisfactory results were obtained. When the load current exceeds 10A, the load was turned off. The upper and lower level responses of this device were also found[5]
to be sufficiently quick, so that the safety of the equipment protection by the device under any undesired transient condition of the main supply was ensured. This device had a very high sensitivity. It was also simple in design, reliable in operation and cost competitive with any other product available in the market. From the above analysis, it is concluded that this device can easily protect electrical appliances against fluctuation of line voltages and over load current

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